Capillary Channel Flow (CCF)

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Glenn Research Center

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Objective:

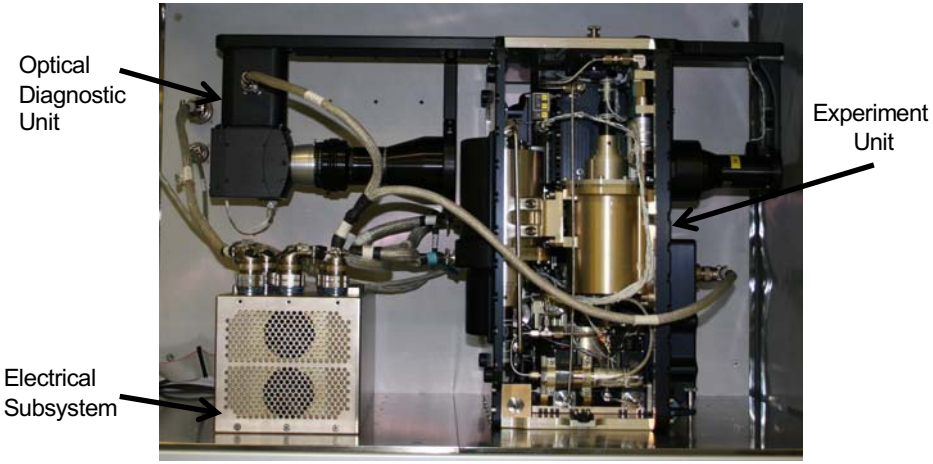
- To enable design of spacecraft tanks that can supply gas-free propellant to spacecraft thrusters, directly through capillary vanes, significantly reducing cost and weight, while improving reliability.

Relevance/Impact:

- The current design of spacecraft fuel tanks rely on additional reservoirs to prevent the ingestion of gas into the engines during firing. This research is required to update these current models, which do not adequately predict the maximum flow rate achievable through the capillary vanes eliminating the need to over design tanks.

Development Approach:

- CCF operates in the MSG and consists of three major systems; two Experiment Units (EU), one Optical Diagnostics Unit (ODU), and one Electronics Subsystem (ESS)/Harness.
- The test fluid is HFE7500, a 3M manufactured thermal engineering fluid, ethoxy perfluoroheptane..
- Additional operations are scheduled to re-run test points not obtained in the first session.



ISS Resource Requirements

Accommodation (carrier)	Microgravity Science Glovebox
Upmass (kg) (w/o packing factor)	90
Volume (m^3) (w/o packing factor)	0.133
Power (kw) (peak)	.170
Crew Time (hrs) (installation/operations)	2hrs install 1.5hrs exchange units 1.5hrs stow
Autonomous Ops (hrs)	1200 hrs
Launch/Increment	STS-131 (19A), Inc 23

Project Life Cycle Schedule

Milestones	SCR	PDR	DeltaPDR	CDR	Ph 0/1 Safety	Ph II Safety	FHA	Launch	Ops	Return	Final Report
Actual/ Baseline	03/2002	05/2005	03/2007	02/2008	06/2007	05/2008	2009	19A 4/2010	Inc. 25-29 Inc. 33/38	05/2014	06/2015